TETRA TECH

April 27, 2016

Ms. Diane McDaniel
Pennsylvania Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 1522

Mr. Griff Miller
USEPA Region 3
RCRA Corrective Action (3LC30)
1650 Arch St
Philadelphia, PA 19103

Re: 2016 Raccoon Creek Area Sampling Work Plan
Lyondell Environmental Custodial Trust
Former Lyondell Beaver Valley Site
Potter Township, Pennsylvania

Dear Ms. McDaniel and Mr. Miller,

On behalf of the Lyondell Custodial Trust (Trust), Tetra Tech, Inc. (Tetra Tech) has prepared this work plan to seek approval from the Pennsylvania Department of Environmental Protection (PADEP) and the United States Environmental Protection Agency (USEPA), (the Agencies) for 2016 sampling in the Raccoon Creek Area, which is part of the Former Lyondell Beaver Valley Site (Site) in Potter Township, Pennsylvania. This sampling is being conducted at the request of the PADEP and the USEPA as stated in emails exchanged on February 9, 2016.

SCOPE OF WORK

Tetra Tech will conduct groundwater, surface water and sediment sampling in 2016. Tetra Tech will provide a summary letter report to the Agencies following each sampling event. A detailed scope of work for the 2016 sampling is provided below.

Water Level Measurements and Groundwater Sampling

Tetra Tech will perform three groundwater sampling events in the Raccoon Creek Area in 2016 which are anticipated to occur in May/June, August, and November. The sampling results will be compared to the November 2015 results, provided to the Agencies in January 2016, to determine if contaminant concentrations are relatively stable, or exhibiting seasonal variation.

Samples will be collected from MW-120, MW-159, MW-160, MW-161, MW-162, MW-163S, and MW-501S. **Figure 1** shows the location of the wells.

Prior to collecting the samples, a synoptic round of water levels will be measured from the monitoring wells and staff gauge located in the Raccoon Creek Area with an interface probe to determine water levels and the thickness of light non-aqueous phase liquids (LNAPL), where present. Groundwater will not be sampled from wells exhibiting LNAPL. Water levels will be recorded to the nearest 0.01 foot and recorded in the field logbook. The interface probe will be decontaminated (sprayed with soapy

Tetra Tech, Inc.
661 Andersen Drive, Pittsburgh, PA 15220
Tel 412.921.7090 Fax 412-921-4040 www.tertratech.com

[Alconox®] water and rinsed with distilled water between wells. A tape measure will be used to measure levels at the Raccoon Creek Area staff gauge. The measurement points at all wells and the staff gauge will be identified (e.g., location of notch at top of PVC casing) to ensure consistent measurements during each sampling event. The synoptic measurements will be taken within a short period of time (within 2 hours).

The monitoring wells will be sampled using low-flow purging and sampling techniques consistent with the PADEP Groundwater Monitoring Guidance Manual (Document Number 383-3000-001 December 1, 2001) and the USEPA Region 1 Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (EQASOP-GW 001, Revision 3 dated January 19, 2010).

A bladder pump equipped with a disposable bladder and Teflon-lined polyethylene tubing, along with a flow-through cell, will be used to purge and subsequently sample the wells. Monitoring wells will be purged at a rate of 0.5 liters per minute (L/min) or less. The depth to water in each well will be measured throughout purging so the flow rate can be adjusted to maintain a drawdown of less than 0.3 feet, if possible.

Field parameters will be monitored in the flow-through cell and recorded every five minutes on field log sheets. The field parameters and their corresponding stabilization criteria are summarized in the following table:

Field Parameter	Stabilization Criteria
pH	+/- 0.1 standard pH unit
Temperature	+/- 3%
Specific Conductance	+/- 3%
Dissolved Oxygen	+/- 10%
Turbidity	+/- 10%
Oxidation-Reduction Potential	+/- 10 mV

Purging will continue until the stabilization criteria are met for three consecutive measurements. Groundwater samples will be collected at a flow rate of 0.25 L/min from the pump discharge tubing, directly into preserved laboratory-supplied containers, and immediately placed in an ice-filled cooler to be picked up by a courier from the project laboratory. After sampling, the bladder pump will be decontaminated by washing with a mix of Alconox® and water and rinsed with distilled water. The samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX).

Quality assurance and quality control (QA/QC) groundwater samples will be collected during each sampling event at the following frequency:

- one trip blank per cooler per day;

- one field blank per event;
- one blind duplicate sample per event; and
- one matrix spike/matrix spike duplicate (MS/MSD) sample per event.

Purge water will be containerized in 55-gallon drums placed in a central location for characterization and disposal following the completion of each sampling event.

Each sampling event should take no longer than one week to complete. Overgrown vegetation may need to be cleared prior to the spring and summer events.

Surface Water Sampling

Surface water samples will be collected once, in May/June 2016, concurrent with the May/June groundwater sampling event. Three samples along Transect #1, #2, and #3 will be collected at the surface, for a total of nine samples (SW-1 through SW-9). **Figure 1** shows the transect locations and sampling points. Transect #1 is intended to represent upgradient conditions, Transect #2 is at or near the Raccoon Creek disposal area, and Transect #3 is downgradient of the Raccoon Creek Area. Transect #2 and Transect #3 are located near the respective Transect C and Transect E, where surface water samples were collected in 1998. Additional surface water sampling at these locations may be required in July/August and November 2016. Tetra Tech will evaluate the May/June 2016 surface water results and will work with the Trust, and agencies to determine if additional sampling is required.

Field parameters (pH, temperature, specific conductance, dissolved oxygen, and oxidation-reduction potential) will be collected from each sampling point and recorded on a field log sheet prior to sample collection. Samples will be collected with a dip pole and poured directly into laboratory-supplied containers. The dip pole will be decontaminated (sprayed with soapy [Alconox®] water and rinsed with distilled water) between sample locations. The samples will be analyzed for BTEX and metals.

QA/QC surface water samples will be collected during the sampling event at the following frequency:

- one trip blank per cooler per day (BTEX only);
- one field blank for the event (BTEX & metals);
- one blind duplicate sample for the event (BTEX & metals); and
- one matrix spike/matrix spike duplicate (MS/MSD) sample during the event (BTEX & metals).

Sediment Sampling

Sediment samples will be collected once, in May/June 2016, concurrent with the May/June groundwater sampling event. Three samples (SED-1, 2, and 3) will be collected along the bank of Transect #1, #2, and #3. The samples will be collected at the surface water/stream bank interface using a disposal trowel. **Figure 1** shows the transect locations and sampling points. The samples will be analyzed for BTEX and metals. Additional sediment sampling at these locations may be required in July/August and November 2016. Tetra Tech will evaluate the May/June 2016 sediment results and will work with the Trust and Agencies to determine if additional sampling is required.

QA/QC sediment samples will be collected during the sampling event at the following frequency:

- one trip blank per cooler per day (BTEX only);
- one blind duplicate sample for the event (BTEX and metals); and
- one matrix spike/matrix spike duplicate (MS/MSD) sample during the event (BTEX & metals).

Staff Gauge

A staff gauge will be installed in Raccoon Creek to measure the surface water level and elevation. Tetra Tech plans to install the staff gauge on an existing permanent feature. If one cannot be located, a steel pipe will be driven into the stream bed. A measurement location will be identified and surveyed on the staff gauge.

Surveying

The monitoring wells and staff gauge will be surveyed to determine their northings, eastings, and elevations. Each location will be surveyed to Pennsylvania State Plane Coordinate System, North American Datum, 1983 (NAD 83). Elevations will be referenced to the North American Vertical Datum, 1988 (NAVD 88), or site specific datum. This information will be used to generate a potentiometric surface for each sampling event.

Raccoon Creek Flow Conditions

The Raccoon Creek flow conditions will be documented during the surface water and sediment sampling event and reported in the respective sampling report. The documentation will include visual observations, and available flow and water level data from the following USGS gauging stations that are near the Raccoon Creek Area.

- USGS Gauging station 03108000 at Raccoon Creek at Moffatts Mill, PA http://waterdata.usgs.gov/usa/nwis/uv?site_no=03108000
- USGS Gauging station 03108010 at Fishpot Run near Shippingport, PA (tributary to Raccoon Creek) http://waterdata.usgs.gov/nwis/dv/?site_no=03108010&PARAmeter_cd=00060
- USGS Gauging station 03108490 on Ohio River above Montgomery Dam & Locks at Ohioview, PA (downstream to Raccoon Creek on Ohio River but in the same pool as Raccoon Creek) http://waterdata.usgs.gov/usa/nwis/uv?03108490

Reporting

After each sampling event, a summary letter report will be submitted to the PADEP and the USEPA. The report will contain a narrative discussing the sampling event, figures, data tables, field log sheets, and the laboratory analytical results. Water level measurements and potentiometric surface contours will be included in each letter report. The November 2015 water level data will be included in the first 2016 sampling report. Tetra Tech has not included data analysis or modeling as part of this effort.

The analytical data will be compared to the following standards:

- Groundwater – Pennsylvania Act 2 Medium Specific Concentrations (MSCs) - Residential groundwater MSCs for used aquifers with < 2,500 mg/L TDS.
- Surface water – Pennsylvania Department of Environmental Protection's Chapter 93 Surface Water Quality Standards.
- Sediment – Biological Technical Assistance Group (BTAG) screening values.

CONCLUSION

Tetra Tech is pleased to have the opportunity to continue to serve the Trust, the PADEP, and the USEPA on this project.

Sincerely,

Keith Henn, PG
Senior Project Manager

Attachment:
Figure 1

cc: Lyondell Environmental Custodial Trust (w/attachment)
Oscar Vazquez-Martinez, PADEP (w/attachment)
Michael Kovacich, Tetra Tech, Inc. (w/attachment)
Jonathan Aglio, Tetra Tech, Inc. (w/attachment)
Derek Amidon, Tetra Tech, Inc. (w/attachment)

PGH P:\GIS\LYONDELL\MAPDOCS\LYONDELL_RACCOON_CREEK_MW.MXD 02/15/16 KM

Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2013 ESRI and its data suppliers).

N

SW-9
SW-8
SW-7
SED-3
Transect #3

MW-159
MW-160
MW-120
MW-162

SW-6
SW-5
SW-4
SED-2
Transect #2

MW-161
MW-501S

MW-163S

SW-3
SW-2
SW-1
SED-1
Transect #1

150 0 150 Feet

Legend

- Sediment Sample Location
- Surface Water Sample Location
- Monitoring Well
- Channel
- Culvert Pipe
- Trust Property Boundary

TETRA TECH

LYONDELL ENVIRONMENTAL
RACCOON CREEK TRANSECTS
AND WELL LOCATIONS
BEAVER VALLEY, PENNSYLVANIA

DRAWN BY: K. MOORE 07/13/15
CHECKED BY: J. AGLIO 02/15/16
APPROVED BY:

CONTRACT NUMBER: 112IC07833

FIGURE NUMBER
1

REVISION
0